1 9626/11/M/J/17/Q7

A school has a computerised weather station which monitors a number of atmospheric conditions or variables.

Describe how data is collected, processed and displayed using such a system.

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.....[6]

STUDENTS RESOURCE

CamScanner

2 9626/11/M/J/18/Q11

Control technologies are affecting everybody in their normal way of life. Some people think this is good; others disagree with this.

Evaluate the use of control technologies in everyday life.

[8]

STUDENTS RESOURCE
CamScanner

3 9626/12/M/J/18/Q5

Computer controlled traffic lights are used to control traffic flow in major cities.

Identify **three** input devices which could be used and describe their use in such a system.

Device 1 .....

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Use .....

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Device 2 .....

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Use .....

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Device 3 .....

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Use .....

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.....[6]

STUDENTS RESOURCE

CamScanner

4 9626/12/M/J/18/Q11

Many major supermarkets now use a variety of monitoring technologies to check the work of their employees.

Evaluate the use of technology to monitor employees in the workplace.

[8]

STUDENTS RESOURCE

CamScanner

9626/11/M/J/19/Q10

A car park has a barrier which operates automatically. It opens when a car approaches it and closes when the car is clear of the barrier.

Describe, including the use of sensors, how a microprocessor controls this operation.

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9626/12/M/J/19/Q3

People in a village are aware that the local river is being polluted. They are concerned that this is being caused by a nearby factory.

Describe how computers and sensors could be used to monitor the level of pollution in the river in order to determine whether the factory is responsible for the pollution.

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STUDENTS RESOURCE

CamScanner

7 9626/13/M/J/19/Q2

Tick the **four** most accurate statements regarding control and monitoring systems and the use of sensors.

	✓
A temperature sensor is able to directly control the temperature of water in a washing machine	
A pressure sensor is often used to monitor the amount of pollution in a river	
A moisture sensor is used to monitor the pollution in a river	
A humidity sensor is often used in a computerised weather station	
Microprocessors are unable to directly read the analogue data produced by a sensor	
In order to control physical variables, microprocessors send signals to actuators to take action	
Passive sensors produce both input and output	
A weather station is an example of a control system	
An air conditioning system is an example of a control system where the output affects the input	
Monitoring systems never need sensors to input data	

[4]

STUDENTS RESOURCE
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8 9626/13/M/J/19/Q9

Below is a spreadsheet of a company's balance sheet. It shows its expenditure, income and profit for each year between 2009 and 2018.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2			Expenditure										
3			Wages	Utilities	Stock		Total expenditure		Income		Profit		
4	2009		350250	54565	475623		€880,438		€925,365		€44,927		very bad year
5	2010		467032	61022	519429		€1,047,483		€1,097,652		€50,169		bad year
6	2011		476414	68124	567178		€1,111,716		€1,185,858		€74,142		bad year
7	2012		512209	75936	619224		€1,207,369		€1,342,020		€134,651		good year
8	2013		553156	84530	675954		€1,313,640		€1,518,483		€204,843		good year
9	2014		648589	93983	737790		€1,480,362		€1,717,886		€237,524		good year
10	2015		732877	104381	805191		€1,642,449		€1,943,211		€300,762		good year
11	2016		774954	115819	878658		€1,769,431		€2,197,828		€428,397		good year
12	2017		838925	128401	958737		€1,926,063		€2,485,546		€559,483		good year
13	2018		868577	142241	1046023		€2,056,841		€2,810,667		€753,826		good year
14													
15			>2011	<2017									
16													
17		Variable average	644357										
18													

(a) Write down the formula which uses a function, in cell G4, to calculate the *Total expenditure* for 2009.

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(b) The percentage profit is calculated by dividing the *Profit* by the *Income*. The company secretary has entered a formula in M4 which displays a message:

- very bad year, if *Income* was less than €1,000,000
- bad year, if the company's percentage profit was less than 10%
- good year, if the percentage profit was not less than 10%

Write down the formula he used in cell M4 which would be replicated in cells M5 to M13.

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You can use the space below for any working you need.

STUDENTS RESOURCE

CamScanner

(c) The manager wants to be able to find the *Variable average* of the wages bill for any sequence of years between 2009 and 2018.
He has set up the spreadsheet to calculate the average between 2011 and 2017.
To calculate the average between any other sequence of years he will just change the conditions >2011 and <2017.

Write down the formula he will need to use in C17 to calculate the *Variable average*.

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.....[6]

You can use the space below for any working you need.

9 9626/11/M/J/20/Q13

Computers are often used for environmental monitoring applications such as pollution in rivers.

Evaluate, by weighing up the advantages and disadvantages, the use of computers rather than humans in such scenarios.

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STUDENTS RESOURCE

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10 9626/13/M/J/20/Q4

Chung and Fai both work at the Vacation Hotel. Chung told Fai that the hotel had just installed a car park barrier system to prevent local shoppers from using the car park. He told her that the manager had said that it was a computer-controlled system. Pressure sensors have not been used and it is impossible for the barrier to lower itself on to a car.

Describe, in detail, how such a system would operate both for a guest arriving at the hotel and for a guest leaving the hotel.

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STUDENTS RESOURCE

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11 9626/11/O/N/20/Q3

A city suffers from the lack of fresh air because of its heavy traffic. A local government agency uses sensors to monitor the level of pollution in the air. The computer system monitors a number of physical variables.

(a) Describe how this system collects and processes this data.

[5]

(b) Compare and contrast the use of monitoring systems with the use of control systems.

[4]

STUDENTS RESOURCE

CamScanner

12 9626/11/M/J/21/Q4

Describe how the data from an air pollution monitoring system is collected and prepared, ready for processing by a computer.

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13 9626/12/M/J/21/Q2

Sensors are used in both monitoring and control applications.

(a) Tick the most accurate statement referring to the use of technology to monitor weather conditions.

	✓
Readings from sensors are not processed before being output.	
A sound sensor is the sensor most frequently used in a weather station.	
Rainfall is measured using a computerised measuring stick.	
Graphs can be produced automatically from a weather monitoring system.	

[1]

(b) Tick the most accurate statement referring to the use of technology when used in systems which control traffic lights.

	✓
An actuator is the most important input device in such a system.	
The timing sequence of the traffic lights is randomly generated.	
An induction loop is used to detect the presence of an automobile.	
Traffic light systems use moisture sensors to detect the presence of pedestrians.	

[1]

STUDENTS RESOURCE

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(c) Describe the inputs, processing and outputs involved in the cooking of a meal using a microprocessor-controlled oven. Include the devices required in your answer.

[6]

14 9626/11/O/N/21/Q6

Computers are often used, together with sensors, to control devices in the home.

Evaluate, by weighing up the advantages and disadvantages, the use of control technology in the home.

[6]

STUDENTS RESOURCE

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15 9626/12/F/M/22/Q4

Computerised weather stations are used to monitor a number of analogue atmospheric variables.

Describe how **three** of these variables are collected and what needs to happen to the data before it can be used by a computer.

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16 9626/11/M/J/22/Q10

A farmer is concerned that the chemicals he is using to improve his crops are seeping into the local river. He has asked a local conservation group to investigate if this is the case. They will be using a computer and one set of sensors to monitor the level of pollution.

List examples of sensors the group will use and describe how they will be used with the computer to monitor the pollution level.

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STUDENTS RESOURCE

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17 9626/12/M/J/22/Q6

Sensors are used in monitoring systems to measure physical variables. It is important that sensors are calibrated before use.

(a) Describe, in detail, these sensors and give an appropriate use for each. Each use must be different.

Humidity .....

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Sound .....

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(b) Explain the importance of calibration.

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STUDENTS RESOURCE
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(c) Describe the differences between one point calibration and two point calibration.

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18 9626/13/M/J/22/Q8

A microprocessor-controlled car park barrier is used to allow cars to enter a car park. When a car approaches the barrier, the barrier automatically rises to allow the car to enter. It does not lower until the car is safely clear of the barrier system. There is a light sensor and light beam source immediately before the barrier. No tickets are issued by the system. The system operates continuously while it is switched on.

Complete this pseudocode algorithm to describe the processing involved. Your pseudocode algorithm should include IF...THEN statements.

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REPEAT
    INPUT reading from induction loop
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STUDENTS RESOURCE

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